National Parks and Protected Areas
# International Bulletin

ISSUE No. 20 FEBRUARY 2006

# GLOBAL CHALLENGES

THIS 20th issue of the Bulletin carries a number of informative first-hand reports from around the world.

An in-depth article sheds light on the protected areas of the Tian Shan mountain range, which stretches 1,500 miles eastward from Uzbekistan across Kyrgyzstan and Kazakhstan to the Chinese province of Xinjiang. Forming a zone of high biodiversity in the arid heart of Asia, the area is little known in the west due to its remote location and the closure of the region to the outside world for much of the 20th century.

John Farrington reports that the opening up of the Central Asia region since the early 1990s has been accompanied by numerous threats to the ecological integrity of the Tian Shan.

***Mountain pasture in Issyk-Kul province, Kyrgyzstan. See article on the Tian Shan mountains, Page 6.***

On the planet's fourth largest island, Madagascar, a community initiative by the Tandroy people to protect an area of spiny forest is evaluated as a conservation model which could be replicated as efforts continue to triple the island's protected areas to 60,000 sq km/23,165 sq miles.

Other articles from the African continent highlight the success of wildlife conservation efforts in the Republic of Congo and in Zanzibar. In the latter, at one of the few privately managed Marine Protected Areas in the world, staff at Chumbe Island Coral Park detail how conflicts with fishermen have been resolved and describe a pioneering hands-on environmental education initiative.

On a visit to the Peruvian Amazon, biologist Andy Donnelly observes the desperate lives of many indigenous people and argues that unless the ecotourism industry proves capable of supporting the local population, environmental devastation caused by mining and logging will escalate.

Other features in this issue include a report on the first International Marine Protected Areas Congress held in Victoria, Australia; and visits to European protected areas in Hungary and the Netherlands.

News reports cover plans to increase protection of Tasmania's rainforests, a US $2.5m plan to rehabilitate Grenada's hurricane-devastated forests, and heritage landscape restoration in Finland.

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central asia

# MOUNTAINS OF HEAVEN: PROTECTED AREAS OF THE TIAN SHAN

*by JOHN FARRINGTON*

RISING to a height of 7,439 m/24,400 ft, the Tian Shan is the world's seventh highest mountain range, only being exceeded in height by the ranges of the Himalaya and the Tibetan Plateau.

The Tian Shan lies on the territory of four nations — Uzbekistan, Kyrgyzstan, Kazakhstan and China, and is Asia's longest mountain range north of the Tibetan Plateau. From the outskirts of the Uzbek capital, Tashkent, the range stretches some 2,400 km/1,500 miles eastward, disappearing into the sands of the Gobi Desert just east of the Silk Road oasis town of Hami, in Xinjiang province, China, with the bulk of the range being about evenly divided between Kyrgyzstan and Xinjiang *(see map)*.

*Tian Shan* is Chinese for 'heavenly' or 'celestial mountains', a name which was probably derived from the fact that the range forms an island of rivers, lakes, forests and verdant meadows separating the forbidding terrain of the Taklimakan desert to the south from the vast Kazakh steppe to the north. No doubt it offered a welcome respite from the sand and steppe for trading caravans plying the Silk Road between the ancient Chinese capital of Xian and the various trading ports along the Mediterranean coast.

Today the range continues to be an important, well-watered, ecological island that forms a zone of high biodiversity in the arid heart of Asia, and acts as an important migration and dispersal corridor for plant and animal species of the mountainous regions of inner Asia to the north, such as the Altai-Sayan ranges of Mongolia and southern Siberia, as well as for species of the Pamir and Himalayan ranges to the south.

Notable mammal species which are threatened or endangered in the Tian Shan include the snow leopard, argali or Asiatic bighorn, Siberian ibex, Tian Shan brown bear, Pallas's cat and Menzbier's marmot. The many lakes and rivers of the Tian Shan also serve as important nesting, wintering and feeding grounds for a wide variety of migratory water birds, notably the whooper swan, bar-headed goose, Demoiselle crane and ibisbill, while the great bustard, lammergeier, Himalayan griffon, short-toed snake eagle, imperial eagle, and saker falcon are found in the steppe and highland areas.

In addition to the wide variety of fauna found in the range, the Tian Shan's geologic history of rapid uplift forming multiple parallel basins has created numerous closely spaced microclimates, resulting in a diverse patchwork of vegetation communities including tundra, alpine meadow, wet meadow, steppe, conifer forest, arid shrublands and — most significantly from a genetics perspective — large tracts of wild fruit and nut hardwood forests, many species of which are the progenitors of domestic species of fruit and nut trees which are commercially important today.

In spite of the Tian Shan's tremendous importance for biodiversity conservation and the ecological well-being of the entire Central Asia region, the range continues to remain little known in the west, a result of its remote location and the closure of the region to the outside world for much of the 20th century by the governments of both the Soviet Union and the People's Republic of China.

However, the opening up of the Central Asia region in the early 1990s has been accompanied by numerous threats to the ecological integrity of the Tian Shan. In the former Soviet half of the range, these threats have resulted from the sudden collapse of the Soviet economic system which left hundreds of thousands of inhabitants without work. This dire economic situation has led to rapid deforestation in the absence of subsidised fossil fuel deliveries.

There are severe overgrazing issues, particularly around villages, as herding collectives have been disbanded and nomadic herding practices curtailed. Widespread poaching of wild animals — both for personal consumption and sale on the thriving Chinese black market for wildlife products — now threatens with extinction species such as the snow leopard. There is also severe over-collection of many increasingly rare species of wild plants for both sale and personal use, including food, medicinal and ornamental plants such as wild tulips and geraniums.

In stark contrast, recent ecological threats to China's half of the Tian Shan have arisen as a result of the booming Chinese economy. This has led to a flurry of road and rail construction, not only to exploit

*The Ak Sai Glacier is a dramatic feature of Ala-Archa National Park, in Kyrgyzstan.*

the region's tremendous fossil fuel and mineral resource wealth, but also to improve access to the Tian Shan's numerous scenic wonders for the hundreds of thousands of increasingly affluent Chinese tourists who visit the region each summer.

The pyramidal Peak Khan-Tengri (6995 m/22,944 ft, *English: Lord of the Heavens),* located on eastern Kyrgyzstan's shared border with Kazakhstan and China, is Central Asia's most sacred mountain and has been worshipped for centuries by Kyrgyz and Kazakh nomads. Formal conservation efforts in the Tian Shan did not begin until the creation of southern Kazakhstan's Aksu-Jabagly Nature Reserve in 1926.

Today, in the former Soviet western half of the Tian Shan, there are 24 national-level parks (IUCN Category II: reserves for ecosystem conservation and recreation) and nature reserves (IUCN Category Ia: reserves managed for strict conservation and scientific research) which form a patchwork of small, extremely isolated protected areas. However, they are probably not — in and of themselves — large enough to adequately protect the rare and endangered species and ecosystems that they were created to preserve. In addition to the system of parks and nature reserves, there also exist dozens of wildlife sanctuaries created during the Soviet period which are typically smaller and less well patrolled, and which today exist for the most part on paper only.

## UZBEKISTAN

Uzbekistan has two major protected areas located at the western-most tip of the Tian Shan. **Ugam-Chatkal National Park** was established in 1990 with an area of 5,746 sq km/2,219 sq miles and is by far the single largest protected area in the Tian Shan, although the park's multi-use designation includes a large dam and reservoir, working farms, grazing lands, and a forestry collective.

Located wholly within Ugam-Chatkal is the 357 sq km/138 sq mile strictly protected **Chatkal Nature Reserve,** which occurs in two geographically isolated sections and was originally established in 1947. Chatkal has a rich flora with 1,168 plant species including rare juniper and wild fruit and nut-type forest ecosystems, as well as being home to snow leopard, brown bear, ibex, booted eagle and black stork. Due to this rich floral and faunal assemblage, the Chatkal was declared a Biosphere Reserve under the UNESCO Man and Biosphere Programme (MAB) in 1978.

*Ranger Kurmanbek Kolgaev and his family in Kyrgyzstan's Naryn Nature Reserve.*

## KAZAKHSTAN

In Kazakhstan's portion of the Tian Shan there are two nature reserves and one national park. The 751 sq km/290 sq mile **Aksu-Jabagly Nature Reserve** is located in the west at the meeting point of the international frontiers of Kazakhstan, Uzbekistan and Kyrgyzstan.

The reserve is centred around several exceptionally deep river canyons and features flora and fauna similar to those of the neighbouring Ugam-Chatkal, including a variety of grassland ecosystems, sparse juniper and wild fruit and nut forest ecosystems, as well as 42 mammal and 238 bird species.

**Ile-Alatau National Park** is one of the Tian Shan's largest reserves with an area of 2,023 sq km/771 sq miles that protects a landscape of forests and glaciers from the crest of the northern Tian Shan along the country's shared border with Kyrgyzstan to a mere 10 km/six miles south of Kazakhstan's largest city and former capital, Almaty. At the centre of the park's territory is the contiguous 733 sq km/283 sq mile, strictly protected **Almaty Nature Reserve,** the heart of which is the dramatic, ice-capped 4,973 m/16,312 ft high Peak Talgar.

Features of the park and reserve complex include the most extensive glacier fields in the northern Tian Shan, over 1,000 species of plants, including extensive conifer forests dominated by Schrenk's spruce, mixed deciduous forest of Turkestan maple and various wild fruit and nut species, and a diverse fauna which includes both alpine and forest dwelling species such as the snow leopard, brown bear, Eurasian lynx, Siberian ibex, stone marten, red deer, eastern roe deer, lammergeier, Himalayan snowcock and golden eagle.

## KYRGYZSTAN

Of the numerous protected areas, the five most notable are the Sary-Chelek Nature Reserve, Ala-Archa National Park, Issyk-Kul Nature Reserve, Naryn Nature Reserve, and Sarychat-Ertash Nature Reserve.

**Sary-Chelek Nature Reserve** is a small but very significant reserve from a biodiversity conservation standpoint, and was established in 1959 with an area of 239 sq km/92 sq miles. Located in Kyrgyzstan's western Tian Shan, the reserve is centred around the scenic 14 sq km/5.3 sq mile Lake Sary-Chelek, which lies at an elevation of 1,876 m/6,153 ft on the south-east facing slope of the 4,500 m/14,760 ft high Chatkal Range.

Standing at the meeting point of several major ecosystems, including spruce forest, juniper forest, wild fruit and nut forest, riparian forest, and a variety of steppe and meadow type ecosystems, the Sary-Chelek reserve is endowed with one of the widest varieties of flora and fauna to be found in the Tian Shan. Due to this remarkable diversity of plant and animal life, Sary-Chelek was declared a UNESCO-MAB biosphere reserve in 1978.

Notable animals inhabiting the reserve include snow leopard, brown bear, Eurasian lynx, badger and peregrine falcon, while some of the more important plant types in the reserve include increasingly rare wild ancestors of several commercially important types of domesticated fruit and nut trees, including wild walnut, wild apples and wild pears.

The west Tian Shan of Kyrgyzstan is said to have the largest remaining stands of wild walnut forests remaining on Earth and, together with Kyrgyzstan's other primordial wild fruit and nut type forests, forms a genetic resource of global importance which may one day be needed to develop disease-resistant



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strains of domestic fruit and nut trees — especially now that international trade is rapidly transporting plant diseases and insect pests worldwide.

Sadly, however, these genetically valuable wild fruit and nut forests are in decline in the Tian Shan for a variety of reasons, including cutting of trees for firewood and lumber, lack of regeneration due to over-harvesting of fruits and nuts for human consumption, lack of regeneration due to overgrazing by domestic livestock in these forests, and collection of seedlings for home orchards.

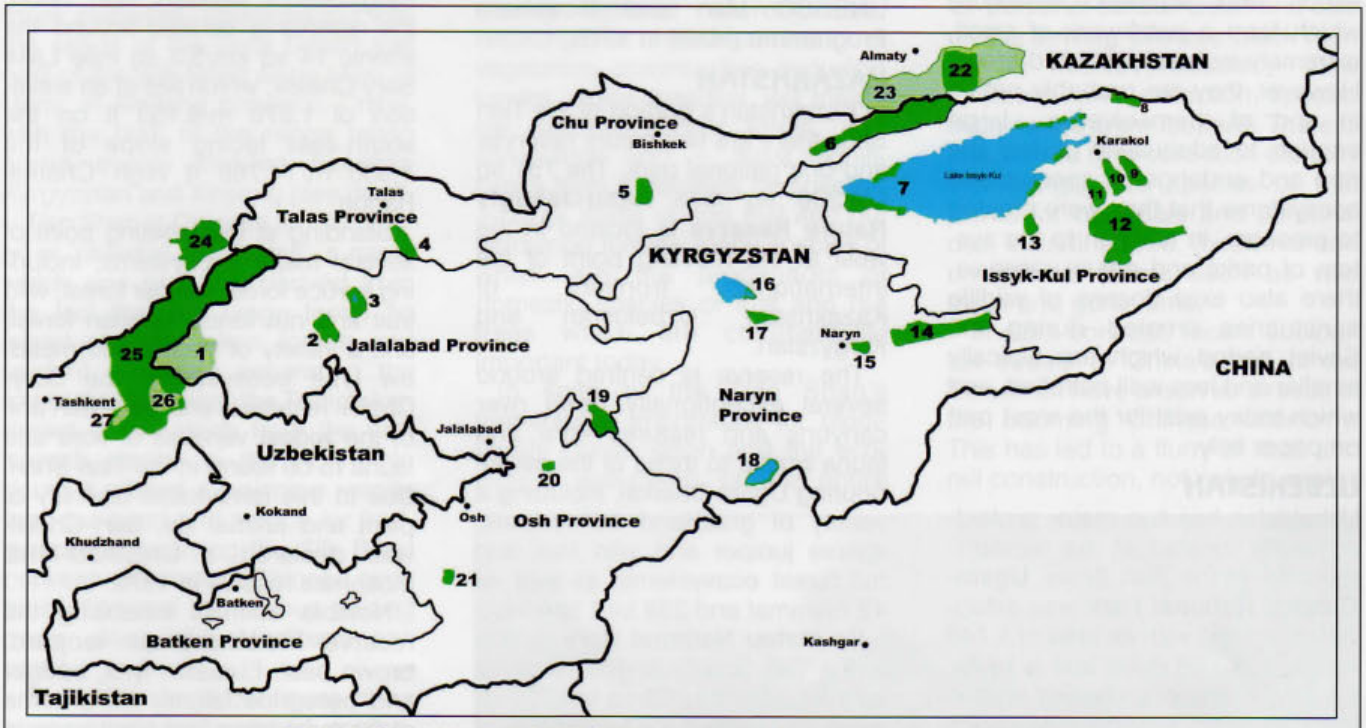
Regrettably, the plight of the walnut forests within Sary-Chelek is no better. Several thousand poor villagers reside in the reserve at the village of Arkyt, and in spite of the ban on harvesting of walnuts, cutting of firewood and grazing of livestock in the core zone of the reserve, these activities continue, with deleterious consequences for conservation of the walnut forests.

**Ala-Archa National Park** is located 30 km/19 miles south of the Kyrgyz capital, Bishkek, and is Kyrgyzstan's oldest and most visited national park. Established in 1976 with an area of 194 sq km/75 sq miles the park covers a 25 km/15 mile long stretch of the steeply plunging Ala-Archa River canyon, and elevations in the park range from about 1,600 m/5,200 ft to 4,895 m/16,056 ft.

The park's ecological features include an exceptionally large area of rare sparse juniper forest in the lower half of the park which is topped by a narrow belt of Schrenk's spruce. In the higher areas of the park, ibex are frequently seen on the sheer slopes separating the glaciers of the parks extensive ice fields, and the park's meadows contain several species of rare wild tulips. The amphitheatre-like canyon cliffs and upper ice fields form one of the most popular climbing spots in Kyrgyzstan as well as attracting thousands of hikers and picnickers each summer.

**Issyk-Kul Nature Reserve** was Kyrgyzstan's first protected area, having been established in 1948 with a total area of 190 sq km/73 sq miles divided into 10 non-contiguous sections which include lake shore, wetlands, and open water. Regrettably, the reserve only attempts to protect a small fraction of Kyrgyzstan's largest lake, the 178 km/111 mile long, 60 km/37 mile wide Lake Issyk-Kul, a spectacularly scenic mountain lake ringed by glacier-capped peaks that the Kyrgyz tout as the second largest mountain lake in the world.

The primary objective of the reserve is to safeguard the wintering grounds of a number of waterfowl species, including both mute and whooper swans. In addition to being a nature reserve, because of Lake Issyk-Kul's unique mountain setting and importance for migratory waterfowl, the entire lake was declared a wetland of international importance under the Ramsar Programme in 1976. Furthermore,




## TIAN SHAN: PROTECTED AREAS (excluding Xinjiang)

**KYRGYZSTAN**

1. Besh Aral Nature Reserve.
2. Padysha-Ata Nature Reserve.
3. Sary-Chelek Nature Reserve.
4. Besh-Tash National Park.
5. Ala-Archa National Park.
6. Chong-Kemin National Park.
7. Issyk-Kul Nature Reserve (10 sections).
8. Keng-Suu Wildlife Sanctuary.
9. Teplokluchenka Wildlife Sanctuary.
10. Karakol Nature National Park.
11. Jeti-Oguz Wildlife Sanctuary.
12. Sarychat-Ertash Nature Reserve.
13. Chong-Jargylchak Nature Reserve.
14. Naryn Nature Reserve.
15. Salkyn-Tor National Park.
16. Karatal-Japyryk Nature Reserve: Lake Song-Kul.
17. Karatal-Japyryk Nature Reserve: Karatal River Canyon.
18. Karatal-Japyryk Nature Reserve: Lake Chatyr-Kul.
19. Saimaluu-Tash National Park.
20. Kara-Shoro National Park.
21. Kyrgyz-Ata National Park.

**KAZAKHSTAN**

22. Almaty Nature Reserve.
23. Ile-Alatau National Park.
24. Aksu-Jabagly Nature Reserve.

**UZBEKISTAN**

25. Ugam-Chatkal National Park.
26. Chatkal Nature Reserve: Maydantalu.
27. Chatkal Nature Reserve: Bashkyzylsaya.

Pictures: John Farrington

*Desert foothills of the Tian Shan in Xinjiang province, China.*

because of the remarkable features of both its natural and cultural landscapes, the entire province of Issyk-Kul, which surrounds the lake, was declared a biosphere reserve under the UNESCO-MAB programme in 2001.

**Naryn Nature Reserve** was established in 1983 on the lands of a former forestry collective in the cold highlands of Kyrgyzstan's inner Tian Shan. The reserve has an area of 1,080 sq km/417 sq miles that occupies a remote, 70 km/43 mile long reach of the Naryn River canyon, the primary tributary forming Central Asia's fabled Syr-Darya River. The reserve protects a major tract of Schrenk's spruce forest on the north slope of the Naryn Range, which provides habitat for some of the largest red deer and roe deer populations remaining in Kyrgyzstan, as well as for Eurasian badger, Eurasian lynx and Pallas's cats. The alpine areas of the eastern reserve are notable for harbouring what is believed to be a significant snow leopard population, as well as large populations of the snow leopard's primary prey species, argali and Siberian ibex.

Because of the sheer terrain in the narrow, winding river canyon, the reserve is largely inaccessible except by foot or horseback — a factor which has contributed greatly to the preservation of the reserve's extensive forest cover and diverse fauna to the present day. While rangers are stationed year round at the eastern and western ends of the reserve, from April to October several rangers are posted in the middle of the reserve and, for the most part, live the lives of self-sufficient semi-nomadic herders for these six months of the year.

Although the severely underfunded reserve has been attempting to attract eco-tourists in a bid to increase its revenues, because of its remote location and competition with much more accessible and equally spectacular neighbouring valleys, the reserve only had six visitors in the two-year period from 2003 to 2004.

More problematic for conservation of the Naryn reserve's large fauna is the presence of five commercial big game hunting camps on the boundaries of the reserve, which largely specialise in argali and ibex hunts for affluent foreign hunters. While each hunter is charged US $5,000 for hunting permits, these fees are paid directly to the national and provincial governments and the reserve receives nothing, even though the reserve is in large part the source of the animals being hunted.

**Sarychat-Ertash Nature Reserve** was founded in 1995 on the lands of several former herding collectives in the distant highlands of eastern Kyrgyzstan's Issyk-Kul Province. With an area of 1,341 sq km/518 sq miles, Sarychat-Ertash is the country's largest protected area, covering almost the entire Ertash River basin and the surrounding treeless landscape of alpine meadows, tundra, and glaciers.

Elevations in the reserve range from about 2,500 m/8,200 ft at the mouth of the Ertash River to 5,125 m/16,810 ft in the icefields of the Ak-Shirak Range in the western reserve. In the wake of the Soviet collapse, 40 herders who had formerly managed 25,000 sheep and 2,500 yaks in the Ertash Canyon were removed from the present-day core zone of the reserve, and the entire canyon is being allowed to revert to wilderness. The results of these actions have been remarkable, with hundreds of argali and ibex quickly reoccupying the canyon, which is said to support the largest population of snow leopards remaining in Kyrgyzstan. *(For an in-depth look at the Sarychat Ertash Nature Reserve, see NPIB issue 15, November 2004.)*

## XINJIANG

Of the half-dozen major protected areas located in the Chinese half of the Tian Shan, the three most significant for biodiversity conservation are the Tuomuer Peak Nature Reserve, the Bayanbulak Swan Nature Reserve, and the Bogeda Peak Nature Reserve. All are IUCN Category V, multi-use conservation areas.

Tuomuer Peak, at 7,439 m/24,400 ft, is the highest peak in the Tian Shan, and is known as Peak Pobeda in the former Soviet Union. **Tuomuer Peak Nature Reserve** was established in 1990 with an area of 2,376 sq km/917 sq miles located at the heart of Asia's largest ice fields north of the Himalaya.



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Although the Kyrgyz side of the peak is a magnet for mountaineers, sadly the Kyrgyz government has yet to protect any of their portion. The lower areas of the Tuomuer Peak Reserve feature alpine grasslands with isolated stands of spruce and birch, while poplars grow along stream corridors. Notable animal species in the reserve include snow leopard, ibex, greater spotted eagle, imperial eagle and great bustard. The upper half of the reserve is composed entirely of barren peaks and glacial ice.

**Bayanbulak Swan Nature Reserve** is a wetland reserve located at an altitude of about 2,300 m/7,550 ft in the central Tian Shan's marshy, 23,000 sq km/8,900 sq mile Yurdus Basin. The reserve was established in 1986 with a total area of 1,487 sq km/574 sq miles and is surrounded by ranges 4,000 m/13,100 ft in height.

The primary purpose of the reserve is to protect the threatened whooper swan and its habitat. Dominant plant cover in the reserve includes common reeds, sedge grass, cat-tails and rushes. At various times of the year the reserve is occupied by 128 species of birds, 25 of which are protected at the national level, with a total 100,000 estimated waterfowl population using the reserve.

In addition to whooper swans, notable bird species which occupy the reserve include the common crane, Demoiselle crane, black stork, whistling swan, mute swan, great egret and bar-headed goose. Predators drawn by the abundance of waterfowl in the reserve include the corsac fox and the common grey wolf.

The first incarnation of the **Bogeda Peak Biosphere Reserve** was the Tianchi *(English: Heaven Lake)* Nature Reserve, established in 1980 with an area of 381 sq km/147 sq mile surrounding the picturesque Tianchi Lake, located in the eastern Tian Shan about 50 km/30 miles east of Xinjiang's provincial capital, Urumqi. Due to the lake region's exceptionally high biodiversity, the much larger UNESCO-MAB designated Bogeda Peak Biosphere Reserve was established around the Tianchi reserve in 1990.

The reserve has a total area of 1,287 sq km/470 sq miles and an extremely large elevation range, from a high point of 5,445 m/17,860 ft atop Bogeda Peak to a low of 450 m/1,480 ft at the edge of the Gurbantungut desert on the northern boundary of the reserve. This wide elevation range has produced extremely diverse ecosystems in the reserve which include sand dune, desert, steppe, shrubland, mixed conifer and deciduous forest, meadow, alpine meadow, tundra, and glacier type ecosystems.

Animal life is said to include snow leopard, brown bear, red deer, lynx, badger and Pallas's fish eagle. The reserve is heavily populated, with a human population estimated to be 134,000 people, located primarily in the reserve's designated outer 'transition zone'. It is also a popular destination for day trippers from Urumqi, with its population of 1.1 million. In contrast to Kyrgyzstan's Naryn Nature Reserve, which had just three visitors in 2004, Bogeda Biosphere Reserve received 350,000 tourists in 2001, putting significant visitor pressure on the reserve's fragile ecosystems.

** In the next issue of NPIB, John Farrington discusses problems facing conservation efforts in the Tian Shan. His research was conducted from September 2003 to November 2004 and was funded by the Fulbright Commission of the US State Department.*

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# NEWS REVIEW

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africa

## SAVING THE LION'S HABITAT

A NEW strategy to save the African lion in eastern and southern Africa was agreed at a workshop convened by the World Conservation Union (IUCN) and the Wildlife Conservation Society in Johannesburg, attended by stakeholders from state governments, local communities, lion biologists and safari hunters.

The meeting concluded that the reduction in the lion's wild prey base, human/lion conflicts and habitat degradation were the main reasons for declining lion populations which need to be addressed.

Over the past 20 years lion numbers are suspected to have dropped from an estimated 76,000 to between 23,000 and 39,000. Across Africa, the lion has disappeared from over 80% of its former range.

bolivia

## FOUNDATION SEEKS PARTNER

THE Puma Foundation, a private non-profit organisation which channels resources to small productive projects to ensure the management and sustainable use of natural resources, is seeking a European NGO partner to help with technical assistance in programme design and strategic planning on how to approach the European Commission Tropical Forests budget line.

EC funding is being sought for a project preparation, monitoring and evaluation system to be implemented in buffer zones around the Madidi, Amboro and Carrasco National Parks.

For more information contact Randy Curtis: *rcurtis@TNC.org*

brazil

## PROTECTORS OF TUMUCUMAQUE

THE International Ranger Federation has welcomed its first indigenous community ranger association as a full member. The Apitikatxi Rangers protect 4.2 million hectares/16,220 sq miles of natural and cultural heritage of the Tumucumaque mountains, in the tropical rainforest of Brazil's Amazon Basin.

The remote area, which is rich in natural resources, is under constant threat from poaching, trafficking (in drugs, animals and weapons), bio-pirates and illegal mining and logging.

22 rangers from indigenous communities were trained in 2005, and it is hoped to have a total of 60 rangers trained by 2007.

# NEWS REVIEW

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*Lake Skadar: rich in wildlife.*

## albania

## FRESHWATER LAKE PROTECTED

THE designation by the Albanian government of a 495 sq km/190 sq mile protected area on Lake Skadar has been welcomed as a major step in the conservation of freshwater habitats in the Balkans.

The lake, which represents the largest body of freshwater in the Mediterranean, is connected to the Adriatic Sea by the Buna River and lies between Albania and Montenegro. Together with an area already under protection in Montenegrin territory, the protected area of the lake now covers almost 900 sq km/350 sq miles.

Around 250 bird species and 45 fish species have been recorded, and dolphins and bears are found in terrestrial and coastal areas bordering the Albanian side of the lake. The new protected area status should help address key threats such as the decrease in migratory birds from a count of 250,000 wintering birds in 1999, to only 80,000 in 2004.

Francesca Antonelli, head of WWF Mediterranean's Freshwater Programme, said: "The protected area status is a great opportunity to promote the natural beauties of the lake and, most importantly, to steer the development of tourism towards sustainability."

## arctic

## POLAR BEARS AT RISK

RESEARCH presented to a conference on marine mammals in San Diego, California, has indicated for the first time that polar bears are drowning because climate change is melting the Arctic ice shelf.

As ice floes are dwindling in size and drifting farther apart, the researchers found that bears are having to swim up to 100 km/60 miles across open sea to find food — and these journeys leave them vulnerable to exhaustion, hypothermia or being battered by rough seas.

Four bear carcasses were found floating in one month in one single area off the north coast of Alaska, where average summer temperatures have increased by 2 to 3 deg C since the 1950s.

Last summer the ice cap receded almost 320 km/200 miles further north than the average of two decades ago, forcing the bears to undertake far longer journeys between floes.

A study to be published this year by the US Geological Survey and the Canadian Wildlife Service will show that in Hudson Bay, Canada — the site of the most southerly polar bears — the population of bears fell from 1,194 in 1987 to 935 last year.

## uk

## PUFFIN SITES THREATENED

PUFFIN breeding sites on several Scottish islands are being threatened by an invasive alien plant species, tree mallow, which has in the past been mainly found in Mediterranean countries.

Due to global warming 2005 was the Northern Hemisphere's hottest on record, and scientists fear that a further spread of this alien plant will harm other UK seabird nesting sites.

Dr Rene van der Wal, of the Centre for Ecology and Hydrology in Banchory, said that tree mallow had already covered a number of islands so thickly that puffins were being prevented from burrowing into the soil to make their nests. The result had been a catastrophic decline in puffin breeding.

One course of action under consideration to remove the tree mallow is the introduction of neutered rabbits to eat the plant's shoots before they can take root.

## himalaya

## GLACIER MELT FILLS LAKES

MELTING glaciers in the Himalayas are causing lakes in the region to fill to dangerous levels, creating an increased threat of disastrous floods, droughts, land erosion and biodiversity loss.

A report in *Nature* magazine revealed that, as a result of global warming, the incidence of glacial lakes bursting their banks has increased ten-fold in the past two decades. Temperatures in the region have increased by more than 1 deg C recently, and are set to rise by a further 1.2 deg C by 2050.

Bhutan government officials have reported that 24 glacial lakes have reached "potentially dangerous" status, and authorities in Nepal report a similar number of lakes at danger level.

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